BEFORE THE ARIZONA CORPORATION COMMISSION

RENZ D. JENNINGS
CHAIRMAN
MARCIA WEEKS
COMMISSIONER
CARL J. KUNASEK
COMMISSIONER

IN THE MATTER OF THE COMPETITION IN THE PROVISION OF ELECTRIC SERVICES THROUGHOUT THE STATE OF ARIZONA.	DOCKET NO. U-0000-94-165 **NOTICE OF FILING**

Staff hereby files its Revised Report of the Working Group on Retail Electric Competition.

RESPECTFULLY SUBMITTED THIS 6th DAY OF SEPTEMBER, 1995.

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Original and ten (10) copies of the foregoing filed this 6 th day of September, 1995, with:

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MEMORANDUM

TO: Parties to Retail Electric Competition Docket
(Docket No. U-0000-94-165)

FROM: David Berry
Chief, Economics and Research
Arizona Corporation Commission
1200 West Washington
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(602) 542-0742 fax: (602) 542-2129

DATE: September 5, 1995

RE: REVISED DRAFT REPORT OF THE WORKING GROUP ON RETAIL ELECTRIC COMPETITION

Enclosed is revised draft of the report of the Working Group on Retail Electric Competition. I received comments from:

- Arizona Association of Industries
- Residential Utility Consumer Office
- Arizona Electric Power Cooperative
- Nordic Power
- LAW Fund
- Tucson Electric Power Company
- AZ Dept. of Commerce Energy Office
- Arizona Public Service Company
- Lothar Schmidt
- Arizona Retailers Association
- Arizona Community Action Assn.
- Arizona Utility Investors Assn.
- Brown and Bain
- Salt River Project

I made changes following most of the suggestions I received. However, I did not make changes if the commenter was advocating a particular policy. Some commenters requested more information and I propose that we develop that information in the next phase.

There are many editorial changes in the report and two major changes: I rewrote much of the introductory section and added a conclusions section. The conclusions indicate what I think are areas of general agreement and then look forward to issues on which we need more information or opinions which will be gathered in Phase II.

I do not wish to get bogged down in producing the perfect report. Rather, our time would be more productively spent if we recognize that this report is evidence of work in progress and instead move along to the next phase. Therefore, I propose that we use our next meeting of the Working Group chiefly to address the conclusions section and deal with remaining comments. Following the next meeting, I will prepare a final draft of the report to conclude this first phase of our work. The agenda for our next meeting is on the reverse side.

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AGENDA
MEETING OF THE WORKING GROUP ON
RETAIL ELECTRIC COMPETITION

September 26, 1995 9:00 a.m. start
Arizona Corporation Commission Hearing Room
1200 West Washington
Phoenix, Arizona 85007

Purpose: Discussion of Revised Draft Report of the Working Group on Retail Electric Competition and Linkage to Next Phase of Investigation

9:00-9:15	Introductory Material
9:15-9:45	Discussion of Section I of Report
9:45-10:30	Discussion of Sections II - IV of Report
10:30-10:45	Break
10:45-11:45	Discussion of Conclusions Section of Report
11:45-noon	Phase II Overview

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REVISED REPORT OF THE WORKING GROUP ON RETAIL ELECTRIC COMPETITION

Docket No. U-0000-94-165

September 5, 1995

Utilities Division
Arizona Corporation Commission
1200 West Washington
Phoenix, Arizona 85007

REVISED DRAFT

REPORT OF THE WORKING GROUP ON RETAIL ELECTRIC COMPETITION

I. INTRODUCTION

This report presents an initial synopsis of many of the major issues associated with restructuring of the electric industry. It identifies some regulatory options and implementation issues, but does not offer recommendations on policy. The report represents work in progress and is not the final enumeration of choices or final analysis of the impacts of those choices. Most of the discussion in this report is taken from meetings of the Working Group on Retail Electric Competition (described below), but additional information has been added from the literature and from publicly available data.

Context

Restructuring the electric industry to allow greater retail competition has been proposed to increase economic efficiency, to lower the price of electric service, and to provide greater customization of electric energy and ancillary services. There is evidence that market prices of electricity could be lower than regulated rates. Figure 1 shows the effective rate (dollars per kilowatt hour) paid by a hypothetical large industrial consumer for electricity supplied by Arizona Public Service Company (APS) or Tucson Electric Power Company (TEP) under fully bundled tariffed rates (in these cases between $0.055 and $0.066 per kWh). If an Arizona industrial consumer could shop around today, he or she might be able to purchase from Public Service Company of Colorado under its Schedule TG or from Utah Power and Light under its Schedule 9 and pay less than $0.04 per kWh plus transmission charges.

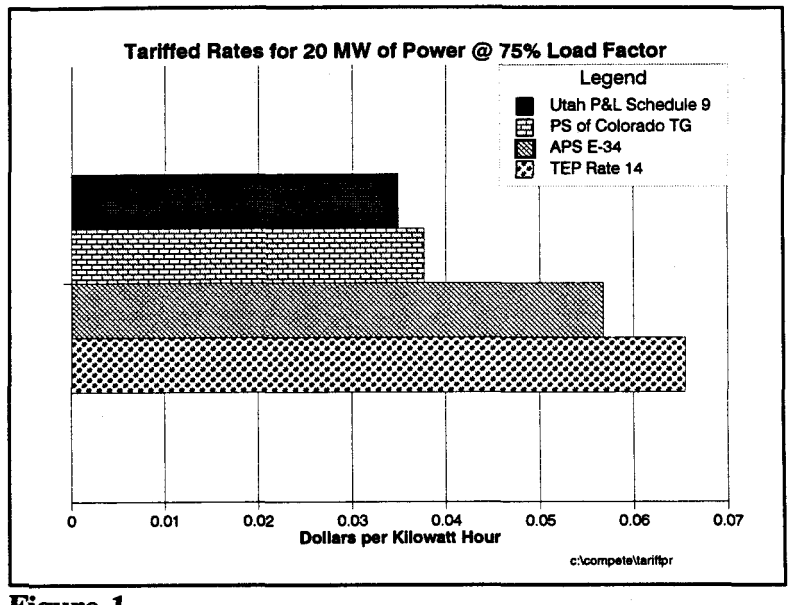

Figure 1

To gain a further perspective on market prices, we reviewed recent Arizona contract prices where, typically, a consumer threatened to generate its own power and the utility responded with a rate lower than the tariffed rate. Figure 2 shows the effective rates (dollars per kWh) for selected recent contracts compared to tariffed rates or, in the case of the AEPCO - PD contract, rates under an existing contract. Contract rates average $0.0128 per kWh less than tariffed rates.

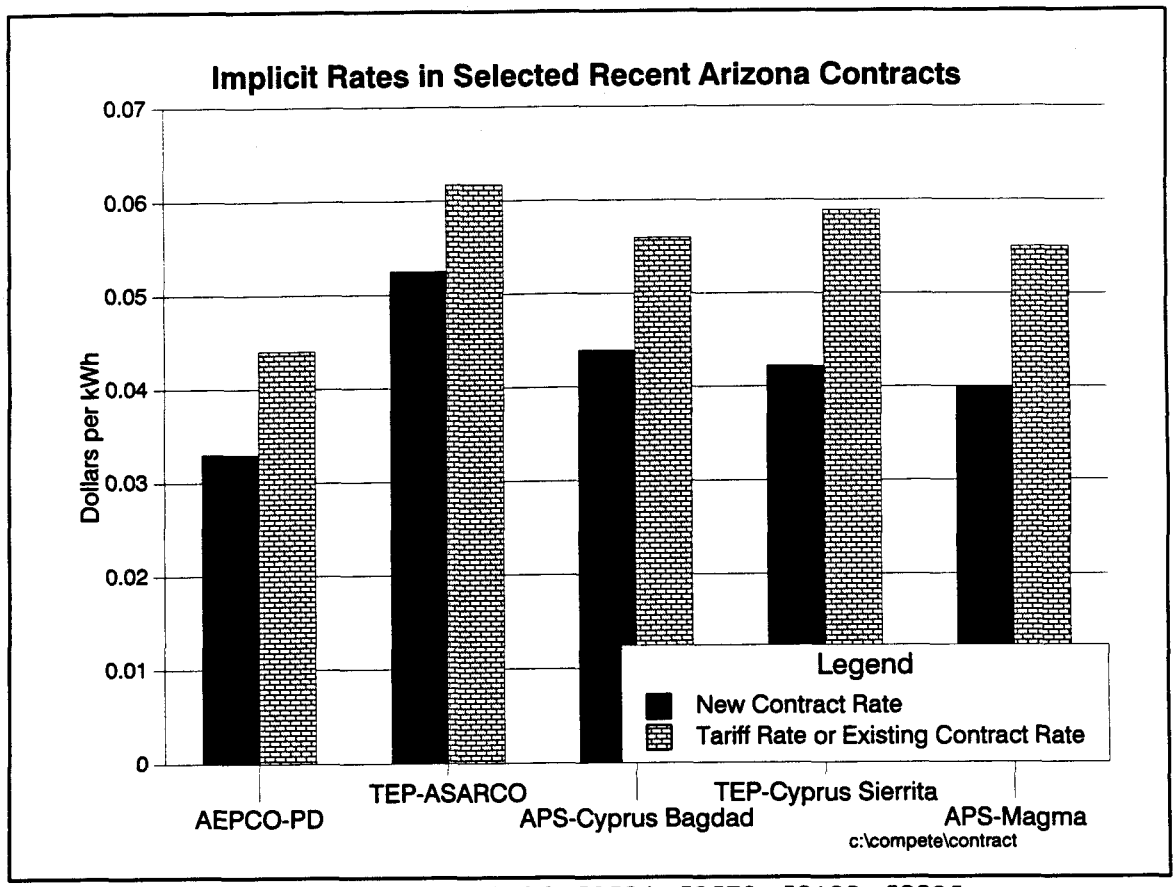

Figure 2 Source: Decision Nos. 59126, 58584, 58570, 58188, 58895

In addition, we examined prices in the wholesale market (excluding distribution and possibly some transmission services) and the costs of hypothetical generation, transmission, and distribution for a new power plant. In 1994, wholesale short term firm or nonfirm energy in the Southwest sometimes sold for between $0.02 and $0.03 per kWh; one wholesale contract for intermediate term firm energy and power in 1995 has a price of about $0.035 per kWh. See Figure 3.

These wholesale transactions do not include all the distribution, transmission, or ancillary services that a retail consumer might need. Further, they are short or intermediate term deals. Therefore, we also examined a hypothetical long term, non-firm, contract with an independent power producer, the cost of which would be between about $0.04 per kWh and $0.55 per kWh, given our assumptions (Figure 3 and accompanying box).

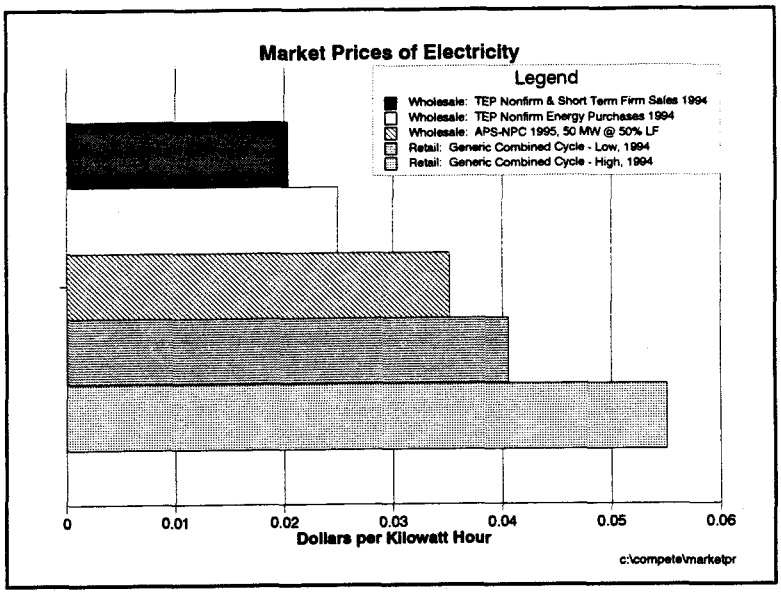

Figure 3

Assumptions for Figure 3

- TEP nonfirm and short term firm sales and nonfirm energy purchases: TEP FERC Form 1, 1994.
- APS-NPC 1995: APS Contract with Nevada Power Company dated September 14, 1993. Price shown assumes 50 MW of power and a 50% load factor for the first year of sales; the rate increases in the second and third years. Half the energy is assumed to be sold during on-peak hours. APS indicates that only limited sales have occurred under this contract.
- Generic combined cycle plant uses cost data from U.S. Department of Energy, Energy Information Administration, *Supplement to the Annual Energy Outlook 1995*, DOE-EIA-0554(95), Table 29, inflated to late 1994 costs. Plant is assumed to be 100 MW run at a 75% capacity factor, with a heat rate of 7707 Btu/kWh. Price pertains to first year of a 20 year agreement; prices in subsequent years increase at rate of inflation. Transmission, distribution, and ancillary costs are assumed to total $10.00 per MWH. Low cost assumes 1995 gas cost of $2.03 per MMBtu escalating at a real rate of 0.007 per year; high cost assumes 1995 gas cost of $2.25 per MMBtu escalating at a real rate of 0.04 per year. Real discount rate assumed to be 0.05. Contract would be for non-firm power.

The difference between tariffed rates and market rates is due to several factors, including:

- Plentiful generating capacity with low variable costs in the southwest, which is a temporary phenomenon.
- Possible inefficiencies in utility production and management processes and in regulation (although some utilities indicate that there are no utility inefficiencies).

- Improvements in new generating technology relative to existing power plants.
- Technological choices made by utilities in the 1970s when nuclear and coal resources were built; in today's market, efficient, natural gas-fired power plants are cheaper to build and run, in large part because of currently cheap natural gas.
- Utility programs, required by regulators, to implement demand side management, but these programs are generally less than about one percent of utility costs; in Arizona Public Service Company's case they add $0.00057 per kWh to the rate.
- The utility's obligation to serve all who request service under traditional regulation.
- Greater retail and wholesale competition, including federal policy to open access to the transmission network.

Investigation Into Restructuring

The Commission established Docket No. U-0000-94-165 to investigate whether and how to restructure the electric industry in Arizona. A consumer's choices today include purchasing from the monopoly electric utility, demand side management, fuel mix, and, in the case of some commercial and industrial consumers, self-generation and locational and plant expansion decisions. With retail wheeling, the consumer would have the additional option of being able to purchase from any willing generator of his or her choice (using the transmission and distribution system) or from a pool of generators. Wheeling refers to transmission of electricity for others and retail wheeling would occur when a consumer or energy portfolio manager purchases electricity from a generator that is not the local utility and has the energy transmitted over the transmission and distribution system owners' lines to the point of consumption.

The first phase of this investigation focused on educating the interested parties, including the Staff and the Commission, on the issues. Subsequent phases will elicit more information about options and address recommendations on policies.

To accomplish the objective of the first phase, educating ourselves on the issues, Staff conducted a workshop in September 1994 and then established a Working Group on Retail Electric Competition. The Working Group met on January 25, 1995, and then broke into three Task Forces to more closely investigate issues regarding retail electric competition. Each Task Force met twice during the first half of 1995. This report summarizes the discussions of the Working Group; Table 1 lists the organizations who have participated in this process.

The Working Group considered:

- Options for introducing competition, including retail wheeling and maintaining the status quo.
- How the options could be implemented, if at all.
- Advantages and disadvantages of the options.

Table 1. Participating Organizations

Arizona Corporation Commission Staff	Residential Utility Consumer Office
Arizona Public Service Company	Arizona Department of Commerce Energy Office
Arizona Electric Power Cooperative	Fort Huachuca
Citizens Utilities Company	International Brotherhood of Electrical Workers
Tucson Electric Power Company	Land and Water Fund
Salt River Project	RMI
Navopache Electric Cooperative	Nordic Power
Trico Electric Cooperative	Enron Power Marketing
Duncan Valley Electric Cooperative	Arizona Association of Industries
Sulphur Springs Valley Electric Cooperative	Phelps Dodge Corporation
Diné Power Authority	Karsten Manufacturing Corporation
Southwest Gas Corporation	Honeywell
City of Mesa	Motorola
Arizona Power Pooling Association	Intel
Arizona Municipal Power Users Association	Vision Power Service
Pinnacle West Capital Corporation	Natural Gas Clearinghouse/Electric Clearinghouse
Arizona Utility Investors Association	Neidlinger & Associations
Snell & Wilmer	Douglas C. Nelson P.C.
Plains Electric	Magma Copper Co.
R.W. Beck	Cyprus Climax Metals
Energy Strategies, Inc.	Arizona Community Action Association
Brown & Bain	Fennemore Craig
Arizona House of Representatives Research Staff	Arizona Senate Research Staff

The Task Forces were:

- **The System and Markets Task Force** -- which investigated transmission access and prices; system reliability; transmission and generation system operation; functioning of markets; and related issues.

- **The Regulatory Task Force** -- which investigated stranded investment; alternative rate regulation; obligation to serve; transaction costs of participating in the market; dispute resolution; legal matters; and related issues.

- **The Energy Efficiency and the Environment Task Force** -- which investigated the role and implementation of demand side management; renewables; environmental consequences of power production; role of integrated resource planning; and related issues.

Criteria for Evaluating Restructuring Options

In its meeting of January 25, 1995, the Working Group identified several major values and interests and these values and interests provide a basis for selecting criteria to evaluate restructuring options (Box A). The major trade off is between decreases in the price of electricity and the need to promote fair electric rates, terms, and conditions, reliable power supplies, a stable investment environment, safety, maintenance and creation of jobs, protection of environmental quality, and efficient energy use.

Summary of Report

Section II addresses system and market issues. Section III reviews regulatory issues and Section IV summarizes energy efficiency and environmental issues. Section V presents some conclusions. Task Force reports on these issues were prepared during the first half of 1995. Industry restructuring has generated a huge literature and the Reference Section lists some useful documents.

The basic policy question is what structure of the electric industry will best serve society, considering the factors listed in Box A. The perception that regulated utility rates are higher than market-based rates has prompted this examination of restructuring. The Commission could opt to retain regulated monopoly utilities with traditional cost of service regulation or with incentive or performance based ratemaking. Or the Commission could seek changes in the wholesale market. Alternatively, the Commission could pursue a policy of restructuring the electric industry, perhaps allowing retail wheeling, perhaps with incentive or performance based ratemaking for utility service to those sectors where competition does not materialize quickly.

Box A POSSIBLE EVALUATION CRITERIA FOR RESTRUCTURING OPTIONS

- **Economic Efficiency**
  - ◆ **Savings Resulting from Decreases in Prices for Electric Energy Services**
  - ◆ **Consumer Choice Among Suppliers**
  - ◆ **Energy Efficiency (including efficient Demand Side Management)**
- **Fairness of Electric Rates, Terms & Conditions**
  - ◆ **Affordability**
  - ◆ **Stability & Predictability**
  - ◆ **Nondiscriminatory Rates & Services**
    - * **Equitable Distribution of Responsibility for Power Production Costs**
    - * **Similar Consumer Choices Among Suppliers Available to All**
  - ◆ **Understandability of Choices**
  - ◆ **Fair Dispute Resolution Process**
- **Reliability of Supply**
  - ◆ **Availability of Power**
  - ◆ **Long Term Stability in Availability of Power (sustainability of power supply)**
  - ◆ **Adequacy of Supply**
  - ◆ **Adequacy of Quality (e.g. absence of voltage fluctuations)**
- **Stability of Investment Environment**
  - ◆ **Preservation of Capital and Maintenance of Return on Investment**
- **Safety**
- **Maintenance & Creation of Jobs**
- **Protection of Environmental Quality**

If retail wheeling is introduced, it could be introduced gradually or immediately. Further, retail wheeling could ultimately apply to all consumers or only to consumers meeting a criterion such as a size minimum or customer classification.

The introduction of retail wheeling requires that many pivotal decisions be made regarding: the breadth of the market; the structure of the market; generation structure; system reliability; transmission and distribution (T&D) regulation; recovery of stranded investment; reciprocity among jurisdictions regarding the ability of suppliers from jurisdiction A to serve consumers in jurisdiction B only if suppliers serving jurisdiction B can serve in A; encouragement of energy efficiency; the role of integrated resource planning; encouragement of renewable generating resources; environmental impacts of power production and delivery; and types of regulation in the noncompetitive sector of the market. Options are outlined in

Table 2 and discussed in detail in the remainder of this report. Outcomes from selecting options depend on various economic and institutional factors, and these are highlighted in the third column of the Table.

Today, it is not clear whether all consumers will enjoy lower prices as a result of competition. The transaction costs of participating in the market may be higher than any cost reductions resulting from competition, especially for smaller consumers. Thus, competition may not bring near-term benefits to residential and small commercial and industrial consumers. However, some parties believe that transaction costs will not be a barrier to market participation by smaller consumers. For example, transaction costs may be reduced if residential and smaller commercial and industrial consumers purchase from energy portfolio managers who aggregate numerous consumers and buy in bulk in wholesale markets. Further, to the extent that consumers must pay for utility stranded investment and mandated demand side management or other programs, cost savings from competition will be diminished.

In addition, there are legal issues surrounding whether and how retail wheeling can be implemented. Some parties believe that these legal issues are large obstacles to retail wheeling. Legal issues are briefly addressed in this report. A more complete review of legal issues may be entertained by the Commission in future legal arguments.

The next phase of the Commission's investigation into restructuring will focus on obtaining more information about the options and their consequences as well as on obtaining opinions on the merits of the options. In particular, Staff will develop questions for interested parties to answer (in writing) to fill in the gaps in our knowledge. Then options can be evaluated using the criteria cited above.

Table 2. Decisions Associated with Introduction of Retail Wheeling

Issue	Regulatory Option	Key Influences on Outcomes
Market Breadth	1) Allow all consumers to obtain service in competitive market 2) Allow only some consumers to obtain service in competitive market 3) Phase in competition	a) Whether high transaction costs will prohibit smaller consumers from participating in market b) Whether non-utility energy portfolio managers will successfully aggregate smaller consumers
Market Structure	1) Require utility divestiture into genco, and transco/disco or transco & disco 2) Allow vertically integrated utilities 3) Require functional separation of generation, transmission, & distribution within vertically integrated utility	a) Can market power of vertically integrated utilities be overcome without divestiture? b) Utility resistance to divestiture c) Regulatory incentives for divestiture c) Authority to require divesture d) Economies of vertical integration
Generation Structure	1) Let market decide on use of bilateral contracts and poolco 2) Require exclusive poolco 3) Require combination of poolco with bilateral contracts	a) Continued growth of spot market b) Ability of investors in new generation to recover long run marginal cost c) Extent of price hedging d) Availability & cost of equipment necessary to record sales and purchases e) Ability to govern a poolco
System Reliability	1) Let market determine system reliability and ancillary services 2) Designate parties responsible for system reliability and ancillary services 3) Regulate standards (and rates) for reliability and ancillary services	a) Transaction costs of setting standards b) Ability to track purchase and sale of ancillary services c) Ability to monitor/control reliability c) Consumer acceptance of levels of reliability
T&D	1) Regulate T&D rates, including metering, billing, etc.	a) Comparability of access & rates b) Rate design
Stranded Investment	1) Allocation of stranded investment among utility, consumers in competitive market, and consumers in noncompetitive market 2) Collection mechanism (e.g., exit fee) 3) Period over which stranded investment is collected (e.g., 5 years, 30 years)	a) Magnitude of stranded investment b) Uncertainty of magnitude of stranded investment c) Utility mitigation of stranded investment d) Effect of recovery on rates e) Effect of recovery on economic efficiency f) Financial impacts on utilities
Reciprocity	1) Allow all sellers to compete (perhaps with regulatory requirements) 2) Allow non-jurisdictional entities to compete only if they allow reciprocal sales in their markets	a) Legal review of Commerce Clause b) Relative advantages/disadvantage of not allowing retail wheeling when other jurisdictions allow retail wheeling c) Need for uniformity of regulation

Table 2. Decisions Associated with Introduction of Retail Wheeling (Continued)

Issue	Regulatory Option	Key Influences on Outcomes
Energy Efficiency & Demand Side Management in Competitive Market	1) Require cost effective DSM programs with mechanism to pay for DSM ◆ only participants pay for DSM programs ◆ nonparticipants also pay for some of DSM program costs 2) Leave DSM to market (including utility provision of DSM as a service paid for by participants)	a) Value of DSM to consumers b) Viability of DSM with & without utility programs, including transaction costs c) Pace of market transformation d) Ability of suppliers or consumers to bypass required DSM program costs e) Effect of DSM costs on rates; perceived fairness of distribution of DSM costs f) Business strategy of energy suppliers
Integrated Resource Planning (IRP)	1) Continue with IRP as currently conducted with only some modifications 2) Revise IRP to parallel business strategic planning 3) Discontinue IRP	a) Planning horizon of suppliers b) Ability of some suppliers (e.g., IPPs) to escape IRP c) Degree of public input d) Long term risks to consumers/society e) Obligation to serve f) Market forces driving resource planning g) Confidentiality of data
Renewable Generating Resources	1) Let market determine investment in renewables and in learning about & profiting from renewables 2) Require sellers to prepare plans and commitments to renewables 3) Require sellers to make specified investments in renewables	a) Transaction costs of participating in market for renewables (including utility knowledge of renewables benefits) b) Costs & performance of renewables c) Business time horizons d) Ability of some suppliers to escape regulatory requirements
Environ-mental Impacts	1) Leave environmental issues to others 2) Require suppliers to indicate how environmental issues are incorporated in plans and commitment of management to implementation of plans 3) Require monetization of externalities	a) Degree to which environmental externalities are captured by existing standards b) Site-specific environmental impacts c) Commitments of suppliers to reducing environmental impacts
Type of Regulation for Non-competitive Market (if any)	1) Traditional cost-plus ratemaking 2) Incentive rate-making ◆ benchmarking prices ◆ treatment of uncertainty (e.g., fuel prices) ◆ quality & reliability standards ◆ rewards & penalties for customer satisfaction, efficiency, productivity 3) Extent of obligation to serve 4) Flexible pricing	a) Possible divergence of long run marginal cost and price b) Ability of buyers and sellers to manage & hedge risks c) Effectiveness of incentives (if any)

II. SYSTEMS AND MARKETS

This section addresses possible structures of the transmission and generation system and associated markets (Box B). The focus of this section is on retail purchases of electricity and the industry structure supporting those purchases. Many aspects of competitive wholesale systems and markets are similar to retail competitive issues; wholesale competition is discussed in conjunction with the scenario where retail wheeling is absent.

Box B Possible Market Structures

<u>Retail Wheeling Occurs for Some or All Consumers</u>

- Vertically Integrated Utilities, Retail Bilateral Contracts Model
- Vertically Integrated Utilities, Exclusive Poolco Model
- Vertically Integrated Utilities, Combined Poolco - Bilateral Contracts Model
- Divested Utility Model

<u>Retail Wheeling is Absent</u>

- Regulatory Incentives
- Wholesale Competition

Utilities Remain Vertically Integrated, Retail Bilateral Contracts Model

With bilateral contracts, consumers could enter into contracts with the generators of their choice and would have to obtain transmission, distribution, and ancillary services. The Federal Energy Regulatory Commission (1995) has proposed classifying ancillary services as: reactive power/voltage control service, loss compensation service, scheduling and dispatching service, load following service, system protection service, and energy imbalance service. Energy portfolio managers could package these various services on behalf of consumers, or individual consumers may act as their own energy portfolio managers. Thus, with bilateral contracts, consumers and their suppliers could develop customized services, in contrast to traditional utility bundled services. Installation of new communications and metering technologies will be required to facilitate transactions.

<u>System Operation:</u> Transactions could occur through negotiated or standard contracts between buyers (consumers or energy portfolio managers) and sellers (utilities, market brokers, power marketers, or independent power producers). Otherwise, system operation could be similar to today's system (but generation, transmission, and distribution services could be unbundled). A distribution utility could control system operations, schedule generation, and provide transmission and distribution services. Consumers, or their agents, would have the opportunity to access the transmission system. With numerous contracts, coordination of operations and scheduling will be more complex than today.

<u>Power Pricing:</u> Prices, terms, and conditions could be negotiated and could vary from case to case. Standard prices might be used for smaller contracts. Ancillary services could be purchased from entities capable of providing them. However, distribution and transmission

prices would still be regulated by the FERC or the Arizona Commission. New accounting procedures would have to be established for unbundled service revenues and associated costs. Spot markets are likely to develop in a bilateral contract environment as they have in a regulated market (e.g., California-Oregon border, and the interchange market).

Facilitating Transactions: The market may, without government intervention, develop market centers or hubs to reduce transaction costs. Among the services which could be provided in a market center are: title transfer, confirmation of transactions, credit standards, invoicing, accounting, scheduling supplies and demands, balancing services (to deal with differences between the amount of electricity contracted for and the amount used), wheeling, dispatch of generation and transmission, routing, short term exchanges, notification for interruptible customers to go off line, trades of imbalances or of energy, and creation of a spot market (Vallen and Sharp, 1995). These services could be provided by utilities, power marketers, or new entrants in the market.

Generation Construction and Operation: Construction decisions would be up to suppliers and the market would determine generation needs. For example, independent power producers could determine when to add capacity and what type to add. In order to obtain financing for new generating capacity, to improve the chances of covering long run marginal cost, and to assure buyers that supplies will be available, generators may have to sign long term contracts with purchasers for the output before construction begins.

Transmission Construction, Operation, Pricing and Access: Transmission would probably remain a monopoly and pricing and access would likely be regulated by the Federal Energy Regulatory Commission (FERC). Reliability could continue to be governed by industry groups, such as the Western System Coordinating Council (WSCC). Coordination between generation suppliers and transmission groups would be needed in construction and operation of transmission systems. The distribution utility may also be involved in coordination.

Consumers or energy portfolio managers could contract with the transmission and distribution system operators for delivery. Technology developments, such as devices that help to control power flows and sophisticated metering and communication equipment, may make it possible for transmission access to be available to all consumers. However, the costs may be prohibitive for many applications.

System Reliability: More transactions could occur than are currently occurring, with more parties involved in each transaction. Operators, generators, and consumers would need to communicate more frequently and new computer software would be needed to facilitate transactions and maintain connectivity. Maintaining reliability will be more challenging. A multiplicity of contracts could create complexities, which currently are not fully understood, in managing the system and its constraints.

Generation reliability and transmission and distribution reliability could be addressed in several ways. In one, current utilities would set criteria, be responsible for operating the system in a reliable manner, and provide ancillary services, such as spinning reserve and reactive power, for a fee. Utilities and other energy suppliers would be responsible for providing reliability at levels consistent with consumers' willingness to pay for reliability. Alternatively, voltage support, scheduling, and some other reliability assurance measures may be provided through reliability service companies, subject to industry regulation.

Advantages of a Bilateral Contracts Model:

With bilateral contracts in a competitive market, generation, transmission, and distribution could build incrementally upon today's utility systems; new institutions would not be required immediately. As in other scenarios, the transmission and distribution systems would remain as a "natural" monopoly. Once communications, metering, and interruption infrastructure are in place, bilateral contracts could allow consumers choices in the reliability of power delivered, price, and suppliers. Where the technology and information exist, some consumers could have lower prices than today. In addition, the incentives inherent in competition could foster innovations that increase production and reduce costs.

The ability to enter into bilateral contracts allows buyers and sellers to tailor rates, terms, and conditions to a specific situation.

The bilateral contracts model also offers generation suppliers the opportunity to enter into long term contracts with consumers. Such contracts may be necessary for investors to take the risk of building new generating capacity.

Disadvantages of a Bilateral Contracts Model:

The transaction costs of negotiating and implementing numerous special contracts among buyers and sellers and among various providers of reliability services and energy portfolio managers could be much higher than parallel costs internalized within utilities today and avoided by having only one monopoly supplier. These transaction costs include expertise needed to develop and implement contracts, manage risks, develop standards, and implement metering and electronic bulletin boards for information on transmission capacity, transactions, and possibly spot market activity, etc. As indicated above, market centers may develop to reduce some of these transaction costs. Only larger industrial and commercial consumers and energy portfolio managers who aggregate many smaller consumers may be able to afford the transaction costs of participating in the market, however. Smaller consumers acting individually may not be able to afford the transaction costs.

Extensive and expensive metering would be required to facilitate choice at the individual

consumer level. The metering technology is currently too expensive for all but the largest consumers.

This model may be less reliable than today's system in responding to abnormal conditions that require system recovery or in normal day-to-day operation. Further, dispatch may not be efficient because the entire system is not centralized for economic dispatch (however, the market may provide incentives for efficient dispatch). Forecasting, planning, fuel supply coordination, and generation, transmission, and distribution maintenance planning could be more difficult.

Other Comments:

The amount of reliability provided might be based on customer preferences. Suppliers would require flexible plans to compete. To obtain financing for new projects, suppliers would need long-term contracts (5 or more years) with purchasers.

Utilities Remain Vertically Integrated, Exclusive Poolco Model

The Federal Energy Regulatory Commission described a poolco as follows:

> [T]he poolco would be an independent entity that would not own any (or would own only a limited number of) facilities, but would control the operation of some or all generators, and all transmission facilities, in a region. The poolco would be open to all generators connected to the grid, who would automatically receive any transmission service needed to sell power into the regional pool. In effect, the poolco would be responsible for creating and maintaining a regional spot market for electricity. The spot price in each trading period (perhaps hour-by-hour) would be readily available and made known to all market participants.
>
> Generating resources would be centrally dispatched on an hourly basis by the poolco in much the same way as in current power pools. The principal difference appears to be that generators would be dispatched based on the bid price they submit to the poolco, rather than on their running costs. The poolco would operate a least-cost (in the sense of lowest bid) dispatch that accounts for any transmission constraints in the same manner as an existing power pool or a single utility dispatch center....
>
> In effect, the poolco would become the market clearinghouse for the hourly energy market.[1]

[1] Federal Energy Regulatory Commission. "Inquiry Concerning Alternative Power Pooling Institutions Under the Federal Power Act." 18 CFR Chapter I, Docket No. RM94-20-000, (October 26, 1994), pp. 5-6.

In the exclusive poolco model, the government establishes the poolco or the industry establishes the poolco. The poolco is an independent system operator which controls *all* power transactions, where *all* generators sell to the system operator and *all* purchasers buy from the system operator. Sales by the poolco are spot market sales with no long term commitments. The poolco would serve as an objective (or independent) system operator, and may be regulated by either government or the industry to ensure neutral operation.

System Operation: All generators present bids to the system operator, and the system operator sorts bids in order of cost to determine which generators to run to clear the market. Purchasers indicate hourly (or other) demand and, if appropriate, how that demand would vary as a function of price. The price of energy is determined in this marketplace, and the poolco will have to set rules for determining the price (e.g., each successful supplier is paid its bid price; each successful supplier is paid the bid price of the highest bidding successful supplier; each successful supplier is paid the bid price of the lowest bidding unsuccessful supplier; etc.). Purchasers from the poolco could be consumers, distribution companies, or brokers who could resell electricity to consumers under short term or long term contracts at (unregulated) negotiated prices. Purchasers must be connected to the electric system. The poolco would have to take into account transmission congestion in dispatching units. Transmission and distribution services would probably remain regulated monopolies.

In this model, energy at any time is viewed as a standard homogeneous commodity. Implementation of the poolco would require the development of new dispatch and contractual arrangements. Everyone could be their own energy portfolio manager, but energy portfolio managers could represent numerous consumers. Separate financial contracts could be allowed, such as contracts for differences or hedging instruments.

The poolco would match load and generation, dispatch power, and ensure physical delivery of energy. Generation needs could be market driven. System reliability could be more complex than the current system, due to the increased number of transactions (however, it may be simpler than the bilateral contracts model). Poolco rules may establish reliability standards. Reliability will also affected by the amount of generation construction, discussed below.

Power Pricing: Electricity at a given hour would be regarded as a standard homogeneous commodity with a standard price, which would be the market clearing price. This price would be publicly available. There could be several parts to a customer's electricity bill: (1) electric energy costs from the poolco via the generator (these prices would be unregulated), (2) transmission costs (regulated by FERC), (3) costs of distribution services from the distribution utility (regulated by the Commission), (4) a reserve margin or other system reliability charge imposed on all suppliers and passed through to consumers, (5) the poolco operator's fee. Prices would be more volatile in this model relative to other models, and financial hedging instruments, including derivatives, probably would be created to manage price fluctuation risks.

Retailing: Marketing would probably become more creative in order for service providers to differentiate their services. The industry could become more service oriented if the electricity itself is a homogeneous product. Provision of energy services and demand side management could be used to differentiate providers. For example, one service provider may specialize in reliability, where another provider specializes in demand side management and cost reduction techniques.

Facilitating Transactions: As discussed in conjunction with bilateral contracts, the market may develop market centers or hubs to reduce transaction costs. The poolco could serve as the market center. (There would be no utility obligation to serve customers purchasing on the spot market.)

Generation Construction: Construction of new generating plants could be risky in the absence of long term sales contracts. Investors would determine whether to invest in the construction of new generating units based upon whether short run marginal cost exceeds long run marginal cost, but the relationship between short run and long run marginal costs could be volatile.

Costs of Operating the Poolco: To ensure that the poolco operates in an independent and neutral manner, oversight will be necessary. This oversight could be performed by state regulators or by the industry. In either case, some costs of oversight will be incurred. In addition, the poolco itself will have operating and capital costs. These have not been estimated.

Advantages of the Exclusive Poolco Model:

With an exclusive poolco, there could be gains in efficiency, especially if there is joint dispatch across multiple utility territories.

Under the exclusive poolco model, all consumers or their agents would know the market price at each hour. In addition, power would be dispatched in order of bid (cheapest first), subject to restrictions on transmission.

Disadvantages of the Exclusive Poolco Model:

Transitional costs to implement this model would include (unknown) costs of setting up the poolco. In addition, overhead costs may increase due to the increased complexities of system operation. For example, new and extensive metering would be required to implement this model, although most consumers might not pay real-time rates but could instead purchase from power marketers or others who buy energy at real-time rates and resell it at less volatile rates.

Bidders in the poolco may game their bids, especially if some have an advantage because of their location or large size relative to the market. Also, bidding would be heavily dependent on short run marginal cost, which could make investments in new generating capacity relatively risky. Companies wishing to build new generating capacity without long term contracts to sell the output of the plants would be less certain of covering their long run marginal cost with an exclusive poolco and may not find investors for generation projects.

Regulators and consumers in low cost regions might not want their utilities to bid into the pool because prices in their region might go up.

An exclusive poolco would have to be mandatory, and participation enforced and possibly regulated by the government. Some parties see such government intervention as no improvement over government sanctioned utility monopolies.

Other Comments:

Society would need to become educated about the new system and risk management strategies. Consumers could customize the purchase of electricity to meet their needs through energy portfolio managers. For example, energy portfolio managers could develop different packages of generation, transmission, and distribution services, and offer various price hedges for consumers.

Vertically Integrated, Combined Poolco - Bilateral Contracts Model

The combined poolco - bilateral contracts model ("combined model") allows for long, medium, or short term bilateral transactions and spot market purchases at poolco prices. Because of the potential for monopoly control of transmission and distribution access and pricing, transmission and distribution would be regulated. In a combined model, the government may require establishment of a mandatory poolco to establish a spot market, or the industry may voluntarily establish the poolco itself in response to market forces to facilitate power transactions. With the availability of both bilateral contracts and a poolco for spot market transactions, consumers have a wide choice of suppliers.

System Operation: Current system operations could be maintained, with the poolco as a source of spot market energy. The poolco would serve as an objective (or independent) system operator, and may be regulated by either government or the industry to ensure neutral operation. It would coordinate power production by generators and coordinate sales to users at a market clearing price. The spot price of energy is determined in this marketplace and the poolco will have to set rules for determining the price as described above for the exclusive poolco. In addition, long, medium, and short term bilateral contracts could be negotiated. Utilities may be responsible for maintaining system reliability, but other generators (connected to the system

with proper metering and controls) may also provide some services affecting reliability.

Generation Construction: Generation construction could be driven by either high short run marginal costs or by long term contracts. Firms building new generating capacity may not have to subscribe all new capacity and could sell some energy on the spot market.

Power Pricing: Long term capacity and energy prices could be established via negotiated prices in bilateral agreements and short term prices could be set through the spot market. Further, long term contract prices could be linked to spot market prices or at least negotiated with knowledge of spot prices. This model could provide more market knowledge about spot prices than would the bilateral contracts model.

Facilitating Transactions: As discussed in conjunction with bilateral contracts, the market may develop market centers or hubs to reduce transaction costs. In addition to the services applicable to bilateral contracts, the market center would also develop a spot market in electricity with spot market prices. The poolco could serve as the market center.

Transmission Construction, Operation, Pricing, & Access: The FERC would govern transmission access and pricing, including pricing to cover new construction. Transmission operation could be carried out by utilities or by the poolco, or by both in a coordinated manner.

Advantages of the Combined Model:

Consumers could have a choice of energy suppliers, and generators would have the choice to bid into the pool or to sell outside the pool. Firms constructing new generating plants could enter into long term bilateral contracts to sell power and thus reduce the risk of investing in new facilities relative to the risks inherent in an exclusive poolco. The poolco spot price could also provide a benchmark, short-term price for bilateral contracts.

Disadvantages of the Combined Model:

A combined poolco - bilateral contracts model will incur unknown, possibly large costs in setting up the poolco. Transition costs would include additional costs of hardware, computer software, metering, and educating the public. Better informed buyers and sellers may profit at the expense of poorly informed buyers or sellers due to information asymmetries in the bilateral contracts segment of the market.

The poolco may be very limited in size if most supply is committed in bilateral contracts.

Other Comments:

Energy portfolio managers could offer retail services. Consumers may hedge against fluctuating poolco prices by contracting with another party who resells electricity to consumers at stable rates and who takes the risk of hourly poolco price fluctuations. Lastly, there is uncertainty about jurisdictional issues, such as FERC regulation of prices in the pool.

Utilities Divest Generation and Possibly Transmission Facilities

With ownership divestiture, the market becomes segmented by function and generation companies are expected to operate in a competitive environment. Under this scenario, the following market sectors could develop.

Gencos: Generating companies that purchase, lease, construct, operate, and maintain power plants.

Poolcos: As previously described, a poolco is an independent system operator that forms a spot market for short-term sales and coordinates power deliveries. Generators and consumers may also be able to execute bilateral contracts in lieu of poolco purchases and sales.

Transcos: Companies that purchase, lease, construct, operate, and maintain transmission facilities.

Discos: Companies that construct, operate, and maintain the local distribution wires.

Retailcos: Retail companies or energy portfolio managers that provide electricity and energy services to end users, obtaining or coordinating the necessary energy, power, transmission, distribution, and reliability services to make retail sales.

System Operation: System operation would continue to be managed by the entities charged with system reliability. Buyers and sellers of electric power, including reliability related generation services, would be required to ensure that reliability requirements are met and that transmission capacity is available to complete the transaction.

Power Pricing: Energy and capacity pricing could be market based. Consumers could engage in bilateral contracts or spot purchases. Necessary ancillary services would also have to be contracted for and high cost load following services may be sold at high prices.

Facilitating Transactions: As discussed in conjunction with bilateral contracts, the market may develop market centers or hubs to reduce transaction costs. In addition to the services applicable to bilateral contracts, the market center could also develop a spot market in electricity

with spot market prices. A commodities market may also develop.

Generation Construction & Operation: Generation needs could be determined by the market and construction could be managed by a Genco. Generation companies must work together with transmission companies, and vice versa, for planning.

Retailing: It will be necessary to assemble packages of generation, transmission, distribution, and ancillary services and develop price hedging arrangements. Consumers, retailcos, or energy portfolio managers could perform these services or the services could be performed by distribution companies. However, distribution companies could simply be common carriers without any retailing functions; in such a situation there may be no obligation to serve and residential and smaller commercial and industrial consumers may be adversely affected.

Advantages of a Divested Utility Model:

A principal reason for divestiture is that any incentive for utilities to impede access to their transmission systems to inhibit competition in generation could be eliminated. In addition, incentives for efficiency gains could be created by unbundling services into profit centers. Cross subsidies among generation, transmission, and distribution would be removed (however, the removal of cross subsidies could be a disadvantage to some parties).

Disadvantages of a Divested Utility Model:

Regulatory authority to require divestiture of utility assets may be questioned and result in a protracted legal dispute. Further, utilities, utility shareholders, and utility debt holders may strongly resist divestiture.

Inefficiencies could result from the loss of traditional coordination of generation, transmission, and distribution services. Also, there is a possible loss of economies of scale. Certain functions could be duplicated increasing administration and marketing costs. If market centers do not emerge, the increased transaction costs of dealing with many suppliers of generation, transmission, distribution, and retailing services may offset any cost reductions due to increased competition.

The Potential for Limited Competition

The various competitive market systems which could evolve may have only a limited number of suppliers (possibly as few as two). At first, there may be numerous generating companies, for example, but through mergers, acquisitions, and failures, the numbers are likely to be reduced as has occurred in other industries. It is possible that only two or three generation

companies will dominate a geographic market, with perhaps a few smaller, specialized suppliers also serving the market. This is not text book competition for consumers, but it might very well be perceived as fiercely competitive by suppliers. It is not clear whether markets with only a few suppliers will approach competitive practices and prices and the outcome may depend on specific conditions in a given area.

Control of transmission and distribution systems could also limit competition. If owners of transmission lines, for example, restrict access or make access to others more expensive than they implicitly charge themselves, competition will be impeded. The Federal Energy Regulatory Commission (1995) is addressing comparability and fairness of transmission access in the wholesale market and similar approaches may be required at the state level with regard to distribution in retail markets. The FERC approach focuses on: requiring transmission owning utilities to obtain transmission services (including ancillary services) for all of its new wholesale sales and purchases of electricity under the same tariff with which it offers such services to others; requiring a transmission owner to unbundle transmission and ancillary services; and requiring transmission owning utilities to rely on the same information about transmission that their transmission customers rely on when buying and selling power.

Operational Model When Retail Wheeling is Absent

Retail wheeling could be absent from some or all of the market because regulators reject retail wheeling or because retail wheeling is encouraged but the transaction costs of market participation are prohibitively high for smaller consumers. In either case, regulators could continue with rate regulation for the non-competitive portion of the market.

To attain some of the efficiencies expected from competition, regulators and utilities could facilitate greater wholesale competition and pricing mechanisms that simulate, to some extent, a competitive market. Regulators, for example, might allow flexible pricing in some circumstances and might base rates on utility performance and market price indicators instead of on historically incurred costs. These topics are discussed in the section on Regulatory Issues. In addition, utilities could unbundle services so that consumers could acquire the services they want instead of buying from a tariff which provides only a standard package of services.

System Operation: System operations could remain virtually the same as today, with the exception that regulatory incentives could be provided for efficient and reliable operations. Utilities would have the obligation to serve and could continue to employ integrated resource planning. Alternatively, if there is evidence that a wholesale poolco would improve electric power market efficiency, a poolco mechanism could be developed. The California Commission (1995) proposed a modified wholesale poolco into which sellers could bid and from which utilities must purchase energy.

Power Pricing: Incentive based rate making could be adopted by the Commission to encourage utilities to improve price competitiveness. Examples of incentive based rates are price caps, performance based rates, and rates linked to price indices. In addition, the Commission could allow flexibility in contracting and in repackaging services (including price, terms, and DSM). The Commission could allow prices to be de-averaged so that prices reflect the costs to serve each type of customer. Services may be unbundled and priced separately. Buy-throughs, similar to the North Star Steel arrangement (Decision No. 58795), may become more prevalent. Incentive based rate making is discussed in the section on Regulatory Issues.

Facilitating Transactions: There may be value in developing market centers even if retail wheeling is absent. The transaction costs of a wholesale market might be reduced by having a market center to administer title transfers, confirm transactions, set credit standards, do invoicing and accounting, schedule supplies, balance services, engage in wheeling, dispatch generation and transmission, route electricity, make short term exchanges, implement a spot market, and trade imbalances of energy. Real time pricing may be used as an option.

Efficiency Improvements Without Retail Wheeling:

If the Commission rejects restructuring as too uncertain or too expensive, there may still be opportunities to improve efficiency and lower costs. To lower prices, utilities could: continue to look for cheaper wholesale supplies; build on-site generation for their customers to defer new generation; use price indices as benchmarks (for example, use other utilities' prices as the benchmark price, or use marginal costs of generic power plants as benchmarks); rethink and reorganize objectives; create functionally based profit centers; reduce capital investments; improve power plant operations; reduce carrying charges on inventories; and reduce debt service.

The Commission could enhance utility competitiveness by approving tariffs with flexible rates.

Incentives for efficient production in a monopoly environment could result in cost and price reductions and benefits which would be system wide and would not just accrue to individual consumers. Further, no new capital would be required unless a wholesale poolco were required. Transition costs would also be minimized. Less equipment would be needed for monitoring individual contracts relative to the other options.

Planning would be more comprehensive and utilities would have a longer run view for planning. System reliability, DSM, integrated resource planning, renewables, and low income programs could be maintained.

Opportunity Costs of Foregoing Retail Wheeling:

Potentially greater benefits under competition would be forgone if retail wheeling were absent. Prices may not be market based and consumers would not be able to benefit from shopping around for services, except for purchases of distributed energy services such as on-site cogeneration or buy-throughs. There is a potential for price discrimination with buy-throughs since not all customers may be eligible for buy-throughs.

Wholesale Competition

Wholesale competition is an alternative to retail competition. To some extent utilities already engage in wholesale competition in determining whether to purchase power and from whom to purchase it. Thus, bilateral wholesale contracts are now used. However, wholesale competition could increase greatly in importance. The California Commission's (1995) proposal for a modified wholesale poolco is an attempt to create greater wholesale competition.

Wholesale competition brings up most of the same issues regarding generation, transmission, coordination, distribution and retailing that retail competition does. Table 3 compares aspects of wholesale and retail competition. Both poolco and bilateral contract arrangements are possible. Open access with comparable rates is required and the transmitting utility has an obligation to provide transmission service at regulated rates.

If a wholesale poolco is established, it may act as an independent system operator for coordination of generation and transmission. Otherwise utilities could act as the independent system operator or a third party could act in this capacity. With a poolco or bilateral contracts, utilities may provide ancillary services.

Distribution and retailing would be similar to today's services, with regulated rates.

Summary of Major Systems and Markets Issues

As the number of buyers and sellers in the market place increases, there will be evolution in the way transactions are accounted for, so that buyers are properly billed and sellers of energy, power, and ancillary services are properly compensated, and so that system reliability is maintained. There is a cost to making such transactions, and several approaches have been proposed to control these costs.

Table 3. Summary of Elements of Competition

Market Component	Wholesale Competition		Retail Competition	
	Via Poolco	Via Bilateral Contracts	Via Poolco	Via Bilateral Contracts
Generation	sets spot prices; utilities may purchase directly from poolco or from brokers/marketers; new units likely to be built by utilities or by IPPs with long term contracts	prices individually negotiated; long term contracts likely; spot market may continue to develop	sets spot prices; consumers may purchase directly from poolco or from brokers/marketers; new units likely to be built by utilities or by IPPs with long term contracts	prices individually negotiated; long term contracts likely; spot market may develop
Transmission	open access with comparable rates required; transmitting utility has obligation to serve at regulated rates		open access with comparable rates required; transmitting utility has obligation to serve at regulated rates	
Coordination of Generation & Transmission	poolco acts as independent ISO; utilities provide ancillary services	utilities may act as system operators or independent ISO established; utilities provide ancillary services	poolco acts as independent ISO; some generators may provide ancillary services	utilities may act as system operators or independent ISO established; some generators may provide ancillary services
Distribution	distributing utility has obligation to serve at regulated rates		open access with comparable rates required; distributing utility has obligation to serve at regulated rates	
Retailing	if no retail wheeling, utility provides menu of monopoly services at regulated rates		consumers may select generator of choice and select from menu of services; rate regulation applies to transmission & distribution only	

One approach to cost control is to build on the existing systems and markets as additional buyers and sellers enter the market via bilateral contracts. However, many accounting and operational complexities can arise that require coordination among buyers and sellers. Market centers may be able to reduce some of these transaction costs by taking on administrative, financial, and physical aspects of operating the power system and its markets.

An alternative approach is to create an independent system operator who is responsible for accounting and operational issues for generation, transmission, and distribution. The independent system operator could run a poolco for some or all transactions. The poolco has the advantage of creating a spot market price in electricity known to all buyers and sellers and of coordinating dispatch so as to minimize short run marginal cost subject to constraints on transmission availability. The independent system operator could also serve as a market center. However, the cost of setting up and running the poolco is unknown.

For a competitive market to work smoothly, investors will need to manage the risks of building new generating plants. One important ingredient in risk management is the ability to enter into long term agreements to sell power from new plants at an agreed-upon rate or rate formula that covers long run marginal cost and produces profits commensurate with alternative investments. If all power sales were required to be made to a poolco and sold from the poolco, prices would tend toward short run marginal cost. Short run marginal cost is likely to fluctuate above and below long run marginal cost.

III. REGULATORY ISSUES

With retail wheeling come several regulatory issues: recovery of stranded investment, changes in transaction costs, new roles for regulation, revisions to a utility's obligation to serve, affordability of service for low income consumers, and legal questions.

Stranded Investment

Several definitions of stranded investment have been offered:

1) "Utility plant not used in the provision of utility service due to technological obsolescence or market changes" *P.U.R. Glossary for Utility Management*, 1992.

2) "...Investment in generation, transmission, or distribution facilities whose market value is less than the net book value of those facilities (i.e. less than the cost of the facilities minus accumulated depreciation)." *Staff Report on the Retail Electric Competition Workshop*, October 1994, p. 10.

3) "Where a customer has a legal obligation to bear certain costs, and finds a way to avoid that obligation, the costs are truly 'stranded.' 'Stranded' cost, therefore, results not merely from costs exceeding market, but from customers leaving without paying costs incurred on their behalf. Put another way, the term 'stranded' should apply only where there is a violation of a *quid pro quo*. There is a violation of a *quid pro quo* where (a) the utility was compelled (by contract or franchise) to make an investment and (b) a customer for whom the investment was intended avoids its cost responsibility for that investment" (Hempling, Rose, and Burns, 1994. p. 5).

4) "... any legitimate, prudent and verifiable costs incurred by a public utility or transmitting utility to provide service to a retail customer that subsequently becomes, in whole or in part, an unbundled transmission services customer of that public utility or transmitting utility" (FERC, 1995).

Figure 4 summarizes the genesis of stranded investment and Tables 4 and 5 summarize stranded investment issues. The stranded investment of interest here is the difference in the present value of the net revenue streams with and without a change in regulation allowing retail wheeling; other forms of stranded investment may also occur as part of a utility's normal business risk under traditional regulation and these are not at issue here since they are not a new risk. In general, stranded investment (attributable to the introduction of retail wheeling) occurs if customers leave a utility's system for another source of supply or if customers pay market-based rates that are lower than regulated rates as a result of a utility's response to competitive

pressures.[2]

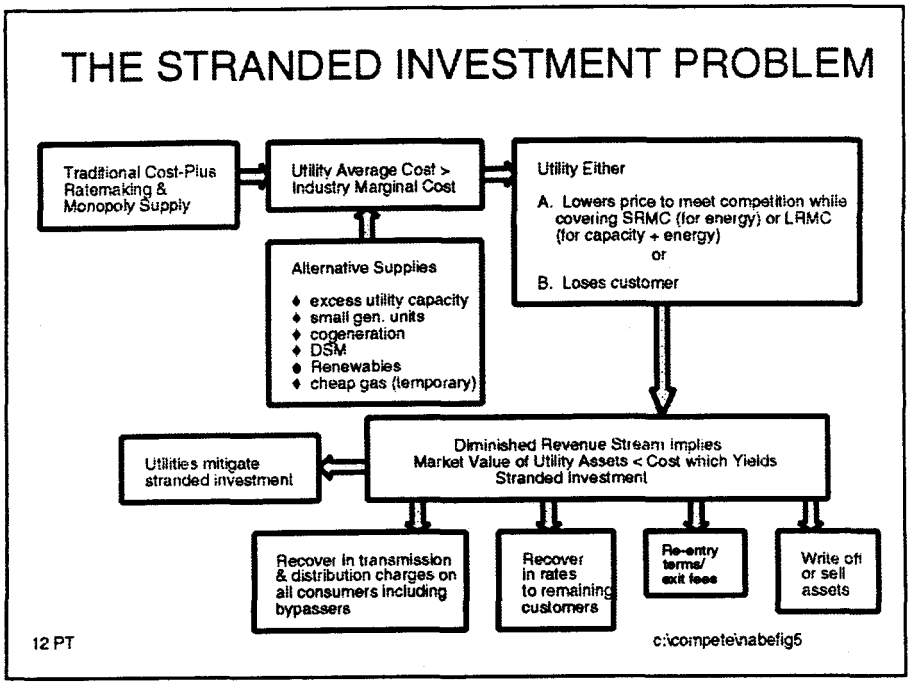

Figure 4

For the present purposes, stranded investment applies only to prudently incurred costs, including regulatory assets, such as deferrals of costs allowed by regulators. Regulators could set charges to recover stranded investment after conducting hearings in which interested parties present arguments concerning the magnitude of stranded investment, who should pay for stranded investment, and what cost recovery mechanisms should be used. "Stranded benefits," such as promotion of energy efficiency, are discussed in Section IV.

The magnitude of stranded investment reflects the aggregate reduction in charges for electric service that would result from a competitive market in electricity, relative to the traditional regulated monopoly structure. If the magnitude of stranded investment is large, then the potential for rate reductions is great and utilities and their shareholders are at risk for taking large losses.

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[2] Stranded investment could theoretically be negative, indicating that utility regulated prices are lower than long run marginal cost and that the market value of the associated assets is higher than book value. Such a situation could occur if, for example, natural gas prices increase greatly and if investments in generation are for gas-fired power plants. If electricity is priced at marginal cost, rates would be higher than they would be under traditional regulation, but the relatively high price would serve as a price signal to obtain additional resources.

Table 4. Who Bears the Costs of Stranded Investment?

Options	Who Bears Cost of Stranded Investment?			
	Utility/ Investors	**Utility Ratepayers**	**Former Retail Customers**	**Remarks**
Utility writes off or writes down assets or sells assets at market value	✓ share values diminish; for coops U.S. govt loans may not be repaid as quickly; utilities may default on loans			property tax payments could decline; higher cost of capital due to greater riskiness of utility business
Utility recovers stranded investment thru re-entry or exit fees			✓ raises effective electricity price of former retail customers	
Utility recovers stranded investment thru transmission or distribution charges		✓ former retail customers and utility customers paying discounted rates pay for stranded investment (if transmission service is used)		seller may absorb some of charges to make sale; lower risk for utilities
Utility recovers stranded investment thru rates to its customers		✓ remaining ratepayers pay for stranded investment, but higher rates may exacerbate attempts at bypass		more consumers bypass utility
Utility offsets stranded investment thru sales of new services or sales to new customers	✓ may mitigate adverse impact on investors	✓ may mitigate adverse impact on ratepayers	✓ may mitigate adverse impact on former retail customers	possibly higher risk to utility & higher cost of capital affecting rates
Mixture of options	distribution of impacts depends on the mixture of options selected			

✓ indicates the party bearing the cost of stranded investment

Table 5. Societal Impacts of Stranded Investment

Options	Impacts		
	Economic Efficiency	**Consumer Responsibility for Prudent Capacity**	**Comments**
Utility writes off or writes down assets or Utility sells assets at market value	price of electricity should tend toward long run marginal cost, thereby increasing efficiency of energy/power choices; introduction of retail wheeling creates new risk that may affect cost of capital	perception that customers are avoiding payments for previous investments to serve them	future investments may be riskier if previous investors do not recover stranded investment; insolvent or bankrupt utility may not be able to serve all areas
Utility recovers stranded investment thru re-entry or exit fees	price of electricity may be > long run marginal cost leading to inefficient energy/power choices	as a group, former customer who benefited from past investments pay for those investments	temporary fees could be regarded as transition costs
Utility recovers stranded investment thru transmission or distribution charges	price of electricity may be > long run marginal cost leading to inefficient energy/power choices	as a group, beneficiaries of past investments pay for those investments (if transmission or distribution service is used)	temporary fees could be regarded as transition costs; may reallocate costs more heavily on some consumers than on others; other users may also pay for stranded investment in wheeling charges
Utility recovers stranded investment thru rates to its customers	price of electricity may be > long run marginal cost leading to inefficient energy/power choices	perception that former retail customers are avoiding payments for previous investments to serve them	reallocates costs to remaining customers; may reallocate costs more heavily on low income consumers; could exacerbate attempts at bypass
Utility offsets stranded investment thru sales of new services or sales to new customers	price of electricity should tend toward long run marginal cost, thereby increasing efficiency of energy/power choices	perception that some consumers are avoiding payments for previous investments to serve them	
Mixture of options	effect of impacts depends on the mixture of options selected		

A type of stranded investment may also occur if retail wheeling is absent but wholesale competition increases. If market generation rates in the wholesale market are less than utility average generation costs and if regulators, therefore, disallow some utility generation investment, losses similar to retail stranded investment will occur.

Magnitude of Stranded Investment

Stranded investment may be regarded as a transitional phenomenon if additional retail competition occurs. The magnitude of stranded investment is unknown but potentially several hundred million dollars in Arizona. It depends on such factors as fuel prices, when independent power producers enter the Arizona market, discount rates, the nature and timing of retail wheeling, structural changes to create a competitive wholesale market, and the period over which investments are assumed to be stranded (e.g., 5 years, 30 years). Further, the magnitude of stranded investment is expected to change over time as conditions change. Indeed, if natural gas prices increase abruptly, stranded investment may disappear.

Estimates can be made of the potential magnitude of stranded investment in Arizona, but those estimates would reflect the underlying assumptions used in the forecast.[3] For regulatory purposes, the magnitude of stranded investment could be either forecast once -- for example, at the time retail wheeling is introduced, or revised on a regular basis taking into account market developments. Errors in estimates of stranded investment can have a major impact on parties responsible for paying for that stranded investment and on the utility.

The concept of stranded investment (due to regulatory changes pertaining to retail wheeling) applies to the entire utility system and the entire magnitude of stranded investment cannot be inferred from the market value of only some assets. If utilities were to sell some assets at market value, the market value would reflect anticipated or known regulatory treatment of stranded investment and would reflect other causes of stranded investment, if any, as well as factors that would increase the asset value above book value.

Utilities can mitigate or reduce some stranded investment by developing new markets, attracting new customers, maintaining existing customers, selling in newly opened markets, reducing costs, changing the rate of amortization of existing assets, and selling assets (such as transmission facilities or customer data bases) if their market value is higher than book value and applying the gain to reduce stranded amounts.

[3] If regulators require that utilities divest themselves of generating assets simultaneously, the market value of these assets could be depressed due to a glut of supply resources being sold, increasing stranded investment.

Collection of Stranded Investment

Stranded investment may be: borne by the utility writing off or writing down assets or selling assets at market value; recovered from former retail customers through exit fees or re-entry fees; recovered from consumers who obtain discounted rates and from former retail customers through transmission or distribution charges; recovered from remaining utility customers through higher rates; offset through sales of new services or sales to new customers; or by implementing a combination of such measures. If consumers pay for some or all of the stranded investment, they will not experience all of the cost savings that competition could bring.

The proportion of stranded investment attributable to retail wheeling to be borne by utility shareholders versus utility customers or former customers is a matter of policy; some parties believe that utilities must recover all stranded investment. The allocation of stranded investment costs among customers or former customers could reflect those customers' responsibility for the investment which has become stranded.

Because the magnitude of stranded investment is expected to change over time, and possibly diminish, the collection of stranded investment from consumers may overcompensate the utility. Thus, regulators could establish a collection mechanism that allows refunds to consumers for overcompensation.

One practical method for dealing with uncertainties of stranded investment is to limit the time period over which stranded investment would be collected to a period of transition from a regulated environment to a competitive environment (e.g., 5 years). If the collection of stranded investment from utility customers or former customers is stretched out 20 or 30 years, much of the benefit from a competitive marketplace will be greatly delayed.

Stranded cost charges will vary from utility to utility and from state to state. Utilities with lower stranded cost charges levied on customers or former customers may have a competitive advantage relative to utilities with higher stranded cost charges.

"Stranded Obligations"

Utilities participating in the Palo Verde Nuclear Generating Station will have obligations to pay for the proper disposal of radioactive waste. These costs are being collected from customers in a decommissioning fund which may or may not be adequate to cover all the costs of waste disposal. If retail wheeling occurs, will the obligation to pay for radioactive waste disposal be stranded, in that the revenues into the decommissioning fund and subsequent increases in that fund are inadequate? To ensure an adequate revenue stream, a stranded obligation cost recovery mechanism such as transmission or distribution charges or exit fees (paid in installments) could be imposed until the proper decommissioning of the plant is

completed.

Transaction Costs and Consumer Protection

Transaction costs are the costs of participating in the market, i.e. the costs of gathering and processing information on price and quality, and the costs of managing price and performance risks. With regard to retail wheeling, self generation, and other distributed energy resources, typical elements of transaction costs, for both buyers and sellers, could include:

- the costs of determining market prices
- the costs of determining an individual consumer's needs for various services
- the costs of learning about the unbundled elements of electricity supply
- the costs of developing contractual arrangements to manage uncertainties about future fuel, operating, maintenance, and capital costs of electric energy services
- the costs of developing and enforcing performance expectations (such as reliability of supplies or impacts of consumer operational fluctuations)
- the costs of consumer protection from misunderstandings or fraudulent practices; in the competitive market for electricity, residential, commercial, and industrial consumers may be victims of fraudulent or misleading energy portfolio management schemes.

Many of these transaction costs are now managed by monopoly utilities and regulators. In a competitive market, these costs may increase and may be managed by various buyers and sellers. High transaction costs (relative to the benefit of electric energy services) may prevent residential and smaller commercial and industrial consumers from participating in a competitive market for electricity on an individual basis. Thus, there may be a benefit to endeavoring to reduce transaction costs and market forces may be able to reduce transaction costs.

One way to reduce transaction costs for residential and smaller commercial and industrial consumers is to purchase from energy portfolio managers who aggregate numerous consumers and buy in bulk in wholesale markets.

Among the actions which the Commission might take to reduce transaction costs are:

- Educating consumers about the elements of electric energy services and factors affecting transaction costs.

- Developing standardized contracts for small consumers which would leave prices open to negotiation but could have a standard menu of options and clear delineation of buyers' and sellers' responsibilities regarding quality of service and price and performance expectations. Standardized contracts may quickly evolve

in the marketplace, anyway, to reduce transaction costs.

- Registering and possibly regulating suppliers to ensure system reliability and consumer protection, especially for residential and smaller commercial and industrial consumers.

- Resolving disputes between buyers and sellers. Disputes could arise from possibly misleading sales offers, from situations in which the consumer's pattern of demand varies from the pattern assumed at the time the contract was written, and from situations which are not addressed in the contract. The role of the Commission may be limited because buyers and sellers could be located in different jurisdictions.[4] Further, if there are numerous disputes, the Commission could be overwhelmed by the volume of activity.

The Role of Regulation

Rate regulation would still apply in noncompetitive markets under the scenarios where there is either: a) limited competition (e.g., direct access to generators being practically available only to some customers or aggregates of customers such as those with a demand greater than 500 kW), or b) regulatory rejection of retail wheeling altogether. Regulation in noncompetitive markets may seek to improve the efficiency of producing and delivering electricity, thereby lowering costs to consumers.

Regulators may seek to promote competition and dilute the market power of incumbent suppliers by requiring divestiture of utilities into generation, transmission, distribution, and possibly retailing firms. Even if divestiture is not required, regulators may attempt to reduce incumbent utilities' market power by requiring utilities to separate their functions as if they were not vertically integrated or regulators may engage in stricter regulation of vertically integrated utilities than of divested utilities.

Table 6 indicates what activities would be regulated under the three broad options of full competition (all consumers have choices among generators), limited competition (only some consumers have choices among generators), and no retail wheeling. These regulatory activities may or may not be carried out in an environment of divestiture or functional separation of generation, transmission, or distribution.

[4] Contracts could specify the jurisdiction where disputes would be resolved.

Table 6. Activities Which May Be Regulated

Activities	Competitive Environment		
	(a) All Consumers Have Choices Among Generators	(b) Only Some Consumers Have Choices Among Generators	(c) No Retail Wheeling
Central Station Generation	siting & safety; but not rates -- competitive market	see column (c) for monopoly portion of market; see column (a) for competitive portion of market	siting & safety; part of rate regulation unless utilities divest generation or unless competitive wholesale market
Transmission	line siting; federal rate regulation		
Generation & Transmission System Operation	regulation of Independent System Operator (ISO), if any, to ensure impartiality and to set administrative charges; if no ISO, regulation to ensure comparable access/pricing for transmission		if no ISO, costs & procedures reviewed in ratemaking; if ISO & poolco to promote wholesale competition, see columns (a) & (b)
Distribution	rates regulated; local siting ordinances apply		
Distributed Generation: on Consumer's site	not regulated-- competitive market; siting regulations apply	not regulated in competitive market; see column (c) for monopoly portion of market	not regulated, unless generation owned by utility (?)
Distributed Generation: to Augment T&D	rates regulated -- part of monopoly system		
Retailing of kWh to End Users	not regulated -- competitive market	not regulated in competitive market; rates regulated for monopoly service	rates regulated -- monopoly
Funding of Mandated DSM	required payments on retailing or distribution services to finance mandated DSM, if any		
Wholesale Power Marketing	federal licensing; no rate regulation		
Energy Portfolio Managers	possible guidelines & registration, especially to serve smaller consumers; no rate regulation	in competitive market same as column (a); not applicable in noncompetitive market	not applicable

Regulators might act as the agent for consumers without practical choices among generators and could contract with the utility for the provision of those services to these consumers. The contract would address such factors as prices and price adjustments (if any), quality of services, quantity of services, timing of supplies, special features such as DSM or renewables, and a term of performance. Alternatively, regulators could regulate the firm, i.e. the utility, its operating characteristics (such as fuel mix), its costs and cost structure, its profits, and its accounting methods. This reflects features of traditional utility regulation.

To promote efficiency under regulation, incentive or performance based ratemaking (the terms are synonymous here) may be used. Performance based ratemaking is often intended to approximate free market conditions and it can serve as a transition from a regulated environment to a competitive market. It may be especially useful if the introduction of retail competition appears to be a litigious, drawn-out process. It should be noted, though, that performance based ratemaking may not be able to achieve the efficiencies of a competitive market. Box C presents some guidelines for incentive regulation.

Box C Some Guidelines for Incentive Regulation

1. Use incentive regulation to better employ the firm's superior information.
2. Prioritize regulatory goals and design incentive regulation to achieve stated goals.
3. Link the firm's compensation to sensitive measures of its unobserved activities.
4. Avoid basing the firm's compensation on performance measures with excessive variability.
5. Limit the firm's financial responsibility for factors beyond its control.
6. Adopt broad-based performance measures where possible, unless their variability is excessive.
7. Choose exogenous performance benchmarks.
8. Allow the firm to choose among regulatory options, while recognizing the interdependencies among the regulatory options that are offered to the firm.
9. Promise only what can be delivered, and deliver whatever is promised.
10. Plan for the rare, unforeseen event, but minimize after-the-fact adjustments to the announced regulatory policy.

Source: Sappington, 1994.

Table 7 identifies major elements of performance based ratemaking, viewing that ratemaking as a contract between the regulators (on behalf of consumers without access to competitive suppliers) and the utility. The table also indicates the risks, incentives, and benefits which a particular component of the ratemaking "contract" might create.

Benchmarking prices is crucial. The benchmark could be outside the control of the parties and may be based on the long run marginal costs of generic capacity additions developed by the federal government or other independent body, fuel price futures or indexes, and electricity price futures (when developed) or indexes. In addition, allowances must be made for area-specific cost elements (such as the number of customers per mile of distribution line). For customers of regulated services to benefit from today's marginal costs being lower than average cost, the benchmark cannot rely solely on utility average cost.

Uncertainty over how benchmark costs will change over time must also be considered in the contract. The table indicates several mechanisms for managing risk, including selection of a term for the contract. There is a trade-off between the comprehensiveness of risk management and administrative complexity.

With performance based ratemaking, price levels can be set so that all classes of consumers benefit, in contrast to the potential situation where, under retail wheeling, only the larger consumers may benefit. Performance based ratemaking also allows the utility to unbundle services and offer consumers a variety of service packages.

Obligation to Serve

With retail wheeling, providers of transmission and distribution services would have an obligation to connect, but no obligation to provide electric energy or capacity, as long as they are properly compensated. But, providers of generation (including back-up services) in a competitive market have the opportunity to serve and market price signals would work to match supply with demand; only in the absence of competition would providers of generation have an obligation to serve. Providers of generation services in a competitive market have an obligation to honor their contracts, of course.

Affordability of Service for Low Income Consumers

In a competitive environment, low income consumers may find electricity less affordable than they do today. Special "lifeline" programs may be needed that lower the rates for electricity for these households. While some suppliers may offer lifeline programs, competitive forces are likely to limit such programs. Therefore, regulators or the legislature would have to step in if they wanted to foster affordable electric rates for low income consumers. Regulators could, for example, require that all entities which sell to residential consumers offer lifeline rates for low income households and that all suppliers to any consumers contribute to the costs of the lifeline rates. This contribution could be levied as a distribution charge, for instance.

Table 7. Elements of Performance Based Ratemaking for Noncompetitive Market

Component of Ratemaking Contract		Risks/Incentives/Benefits	
		To Utility	To Customers
Bench-marking prices	To marginal cost (MC) for generation (e.g., MC of generic unit or of specific utility)	ensures covering marginal cost, price could be < avg cost; long run MC appropriate to reflect costs of adding capacity	risk that utility MC > industry MC
	To market price index for generation	price could be < utility MC, avg cost	
	To average cost		price could be > MC
Uncertainty of Future Costs	Fixed price over term of contract	marginal cost could increase rapidly, adversely affecting utility	price stability, but could forego benefits of falling MC
	Price escalators tied to other market information	could alleviate risk of rapidly increasing MC	could reflect decreasing MC
	Contract re-opener	prevents extreme risks	prevents extreme risks
	Diverse portfolio of supply/demand resources	to hedge against rapid increases in MC	to hedge against rapid increases in MC
Term of Contract (see uncertainty above)	Short	allows frequent realignment of rates & costs	allows frequent realignment of rates & costs
	Long	may lock in some desirable features but risk that costs and rates diverge greatly	may lock in some desirable features but risk that costs and rates diverge greatly
Maximum/ Minimum Power & Energy	Specified limits	makes longer term planning less risky	supplying unanticipated load growth or loads less than the minimum may be expensive
	Supply all requirements	makes longer term planning riskier	
Minimum Quality & Reliability Standards		note: industry is self regulated with respect to many technical aspects of quality & reliability	may protect consumers; consumers desiring higher quality can contract separately
Rewards & penalties	For customer satisfaction	encourages attentiveness to customer needs	setting standards may be complicated
	For energy efficiency	incentive must be compared with profits of load building	to encourage DSM that is less costly than kWh & kW
	For productivity	encourages economic efficiency	setting standards may be complicated; customers could share savings

Legal Issues

There are legal issues inherent in pursuing retail wheeling. Among these are:

- Recoverability of all prudently incurred costs.
- The complexity and legality of compulsory divestiture of generation, transmission, and distribution facilities by vertically integrated utilities.
- The regulatory and legal basis for permitting retail wheeling given exclusive (i.e. monopoly) certificates of convenience and necessity.
- The need for federal legislation permitting or requiring reciprocity among utility service areas since neither individual state regulators nor state legislators have comprehensive jurisdiction over multiple state service areas.
- The ability to engage in performance based ratemaking under Arizona law requiring that rates be set considering fair value.
- Creation of a "level playing field" where no competitors have artificial advantages (e.g., tax treatment, tax deferrals, government financing, regulation).
- The potential for and consequences of degradation of electric service to rural or other areas.
- The Rural Utilities Service's and the federal government's responsibility to obtain repayment on the loans they made to rural electric cooperatives.
- Limitations on the ability of cooperatives to sell electricity or transmission service to non-members.
- The relative importance of economic forces promoting competition and of legal barriers to competition.
- Equity of access to the benefits of competition for all types of consumers.
- State versus federal jurisdiction over transmission, generation, and distribution.

Legal issues will be important in establishing a Commission policy on retail competition. These issues will be developed in future activities in this Docket.

IV. ENERGY EFFICIENCY AND THE ENVIRONMENT

Under regulation, considerable attention has been given to energy efficiency and the environment in connection with electric utility long range planning. If retail wheeling is introduced, will the public interest in energy efficiency and environmental protection be adequately fostered? Four aspects of energy efficiency and the environment are discussed here: demand side management (DSM), renewable generating resources, environmental effects of power production and delivery, and integrated resource planning.

Demand Side Management

DSM is defined by the Energy Information Administration as "the planning and implementation of strategies designed to encourage consumers to improve energy efficiency, reduce energy costs, change the time of usage, or promote the use of a different energy source."[5] DSM can be a long-term, cost effective, resource that substitutes for generation, transmission, or distribution resources; it may be less costly to society than power generation, transmission, or distribution facilities. Consumers who employ DSM will see lower energy bills and suppliers of DSM may offer DSM services as a profitable business. In some instances, DSM may be viewed as a social program that is not cost effective or as an environmental resource because it may reduce pollution associated with power production.

The continuing existence of significant opportunities for DSM suggests that the transaction cost of participating in the market for DSM may discourage adoption of some cost effective DSM measures. Utility DSM programs are intended to lower these transaction costs and to help transform the market so that cost effective DSM measures are widely available and marketed actively. DSM is also promoted through building codes and appliance standards, and by Energy Service Companies (ESCOs). Utility DSM programs have been criticized by some because non-participants may balk at paying for others' DSM.

In a competitive environment, the question is whether cost effective DSM will still be provided.[6] If it is not, competition will, ironically, result in inefficiency. Figure 5 indicates that utilities may approach DSM as a customer service or drop DSM as part of their business

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[5] *Commercial Buildings Characteristics 1992*, DOE/EIA-0246(92), April 1994, p. 427.

[6] DSM could be provided on a totally unregulated basis, by a separate government agency responsible for implementing DSM, by a disco, or through a quasi-governmental agency which collects funds for DSM for private sector implementation. DSM programs could be divided into:

- Cost-effective DSM relative to generation, transmission or distribution resources, whether funded by the consumer or by nonparticipants;
- Socially desired DSM that may have a long payback or for which savings are hard to measure, such as educational programs, market transformation, or low income programs;
- Part of bundled energy services (such as power quality, reliability, energy, and DSM bundles);
- Customer retention or attraction DSM programs.

strategies. The DSM market may exhibit high transaction costs (e.g., limited consumer information about the costs or benefits of DSM, limited risk management tools), or low transaction costs. Transaction costs are decreasing for some commercial and industrial customers because trade allies are stocking more energy efficient equipment, and some large consumers undertake systematic reviews of DSM opportunities and follow through if DSM is competitive with other organizational objectives & projects.

There are four outcomes shown in the figure. The one of concern is the upper right hand box, where transaction costs are high, thereby limiting the role of ESCOs, and where utilities withdraw from wide application of DSM programs, resulting in energy inefficiency.

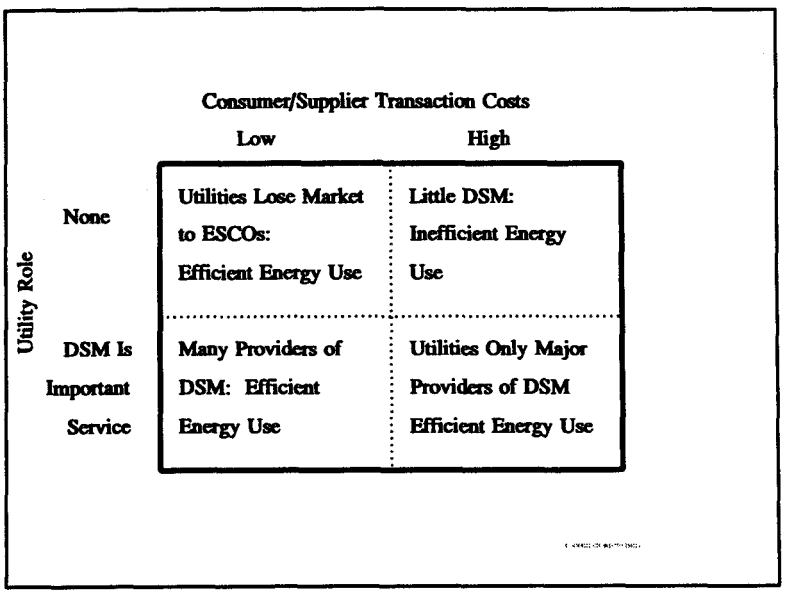

Figure 5 Possible Outcomes for DSM

Some utilities may reject DSM in a competitive environment because their profits are perceived to be linked only to the volume of energy produced, transmitted, or delivered and reductions in the volume of energy imply a reduction in profits. Utilities may also regard DSM as an avoidable cost and to remain competitive, they must avoid all possible costs in the short term. Utilities may now engage in DSM only to keep regulators happy and may discontinue DSM if regulatory requirements are relaxed. Utilities may further regard themselves to be at a disadvantage if their competitors (e.g., independent power producers) do not have to provide and pay for DSM services.

In contrast, some utilities may offer DSM in a competitive environment, whether or not ESCOs also provide DSM. Utility-provided DSM may be a profitable, customer-driven service to attract or retain customers and marketed as a service that consumers value. DSM could be offered as an unbundled service or as part of a package of services (which could include kilowatt hours of electricity). DSM may also be marketed to promote an energy efficient society (perhaps linked to energy standards and codes). In a competitive environment, ESCOs may or may not wish to work with utilities, in distinction to past cooperation.

If utilities abandon DSM, other businesses may pick up the slack if transaction costs do not greatly restrict the market. Trade allies may use DSM as a business strategy, and ESCOs

may package DSM with other services (e.g., plant maintenance services). However, ESCOs may concentrate only on larger commercial and industrial consumers, not smaller commercial and residential consumers (or low income consumers). Further, if electric rates fall, DSM will be less attractive to consumers, ceteris paribus. However, DSM prices may also fall as technology improves, as more trade allies stock and recommend energy efficient measures, and in response to falling electricity prices.

If regulators believe that demand side management should continue and that neither the utilities nor ESCOs will provide significant DSM to some sectors (e.g., residential consumers), some utilities or distribution companies could be required to offer DSM programs. These programs could be paid for by all consumers through a charge on transmission and distribution. Thus, it would be difficult for most consumers to escape paying for DSM costs, even if they receive service from a supplier other than the local utility.

Finally, the DSM in a competitive environment may not be affordable by low income consumers. If utilities offer only programs in which participants repay the costs of the DSM measures or if only ESCOs offer residential DSM programs, low income consumers may not be able to afford much DSM. Consequently, without some form of mandatory low income program, paid for by a wide range of consumers through distribution or other charges, low income consumers may not see the bill reductions that cost effective DSM could bring.

Renewables

Renewables can serve as generation resources or as resources to augment transmission and distribution system capacity.[7] Further, renewables can be used at the consumer's site or at a central station. Renewables have several valuable features, including:

- use as a hedge against fossil fuel price uncertainty,
- modularity in which some renewables' capacity can be increased slowly or rapidly as needed,

[7] Renewables are defined to be "... resources that continuously can be replenished in the course of natural events within the limits of human time" (Soil Conservation Society of America, *Resource Conservation Glossary*, 3rd edition, Ankeny, Iowa, 1982). Common forms of renewable energy technologies are:

- biomass consisting of wood, wood waste, agricultural waste, municipal solid waste, and landfill and digester gas,
- geothermal resources, including hydrothermal resources and hot dry rock
- hydropower
- photovoltaics powered by sunlight
- solar thermal resources (e.g. central receivers, dish Stirling generators)
- windpower

- lessened environmental impacts in some instances than conventional generation technologies, and
- cost-effectiveness in some distributed applications, and possibly in some central station applications. Benefits of distributed renewables could include avoided distribution lines, deferred transmission capacity additions, deferred transmission maintenance, reduced energy losses, reduced environmental impacts, increased reliability, and modular design that better matches the size of the electric load. Benefits of central station renewables used for generation could include lower energy costs, reduced environmental impacts, hedges against uncertainty in fossil fuel prices and modular design that better matches the size of the electric load.

Retail wheeling may decelerate the development of renewables in favor of short run cost minimization. The transaction costs of renewables may prevent their use, even in what appear to be cost effective applications -- limited knowledge of how to use renewables in central station and distributed generation, transmission, and distribution situations, and limited knowledge of risk management techniques, for example. Electricity suppliers may thus overlook research and development opportunities and neglect currently cost effective applications of renewables.

Renewables often have high up-front costs (and low operating costs), thereby making them less attractive to suppliers trying to avoid costs in the short term. If electricity suppliers seek to avoid costs in the short term, they will not make commitments to buy renewables today to help to lower costs in the long run. Manufacturing economies of scale may bring down future prices, but if demand grows slowly, these economies of scale may never be achieved.

Fostering renewables may be enhanced by statewide efforts to reduce air pollution. Emissions limitations, for example, would make some renewables more attractive relative to fossil fuel generation.

If regulators believe that renewables should be employed by suppliers beyond amounts which are currently cost effective, and that suppliers will tend to give inadequate attention to renewables, suppliers could be required to undertake research and development and deployment of renewables.[8] Such programs could be paid for by all consumers through a charge on transmission and distribution. Thus, it would be difficult for most consumers to escape paying for renewables that may ultimately benefit society, even if they receive service from a supplier other than the local utility.

[8] A requirement that all suppliers use renewables could be transferrable so that a supplier could, for example, invest in renewables for itself and for another supplier if that second supplier compensated the first.

Integrated Resource Planning

Integrated Resource Planning (IRP) for electric utilities has been adopted in over 30 states, including Arizona. Arizona utilities have completed two cycles of IRP and are preparing to commence the third IRP cycle.

Traditional IRP has several goals. It seeks to minimize the costs of providing electric energy services (including environmental costs); to ensure that utilities consider all viable resources (DSM, renewables, power purchases, conventional generation, etc.) on a comparable basis; and to foster a long term view of planning rather than a short term view. IRP also examines the reliability of the electric system. IRP can also contribute to improvement of analytical techniques such as decision making under uncertainty.

The IRP process is a public process. It allows stakeholders, regulators, utility staff, and possibly future utility competitors to seek solutions to complex problems in an open, public forum and allows increased accessibility of the public into the utility planning and decision-making process.

IRP has value to utilities. Utilities engage in planning as a matter of good business practice, although typical business long range planning deviates from IRP. Utilities may use IRP to argue against future disallowances of the costs of those facilities that were reviewed in the IRP process, for example. Further, IRP allows parties to jointly plan up front and lessens the chances of utilities receiving blame after the fact. And IRP may improve utility decision making under uncertainty, with lower long run costs than would have otherwise occurred.

With emergence of interest in retail electric competition, the nature and appropriateness of IRP in a restructured, more competitive electric industry are uncertain (Hirst, Tonn, and Bauer, 1995; Hirst, 1994a and 1994b; Newcomb, 1994). The IRP process as it has been implemented, is cumbersome, and it may be incompatible with an increasingly frenzied market where flexibility over short time periods is necessary.

In a competitive environment, planning could start from a focus on consumer needs. This contrasts with traditional planning practice which starts from estimates of aggregate demand, moves to large, central station plant selection, and finally addresses the transmission and distribution system that is needed to get the electricity from the large plants down to the individual customers. Planning in a restructured industry may start from the needs and demands of the individual consumer and then might proceed in the opposite direction. This will force the electricity provider to learn what customers want and what it costs to serve them. However, customers that do not generate large margins (e.g., low income consumers) may be ignored in such a process.

As competition emerges, differences in requirements to conduct resource planning may adversely affect utilities. Some organizations are required to do IRP, and some, such as independent power producers, are not. If only some are required to engage in IRP, are they at a disadvantage? If IRP became more like business long range planning, the disadvantage of having to conduct integrated resource planning may diminish. Utility competitors are likely to engage in long term planning, albeit as a private, not public activity. However, the demands of large customers could dominate planning and decisions in a privatized, competitive environment.

What would be foregone if IRP is abandoned in a competitive environment? Planning could lose its long term focus. Various useful planning techniques and strategies could be discontinued and replaced with a short-run, quarterly profit focus. A short term focus could be detrimental to consumers, since prices may be higher in the long run than they would have been with careful long term planning. Further, without resource planning, it is unclear whether system reliability will be maintained and who will be responsible for maintaining system reliability.

Public involvement in planning will change if retail wheeling occurs. Depending upon the type of restructuring adopted (if any), public involvement may be more; it may be less; or it may change significantly in nature. Opportunities for public input could increase through utility/provider-sponsored focus groups, surveys, or public meetings. Further, the responsiveness of competitive markets will replace public involvement in integrated resource planning, rate hearings, etc. However, those without market power will lose the current public involvement advantages that exist within IRP proceedings, and the market could overlook environmental externalities, eschew long term investments, and exclude some resources (such as DSM) because of high transaction costs.

The IRP process also generates considerable public information. Some of this information will become "proprietary" in a competitive market and it will no longer be available to the public.

Environmental Issues

One of the major concerns related to the possibility of electric industry restructuring is that detrimental environmental impacts may increase as utilities and other electricity providers strive to be low-cost providers of kilowatt-hours. Under traditional IRP, environmental impacts of power production and delivery can be examined.

If some generators (i.e. utilities) are required to consider environmental impacts beyond existing standards because of a utility regulatory requirement, but others escape this requirement, will the regulated utilities be at a competitive disadvantage? In a competitive situation, some generators may thus wish to abandon all consideration of environmental impacts, beyond what

is required in state or federal regulations, in order to lower their market price.

Environmental strategies may be pursued without IRP, however.[9] Voluntary corporate commitments that reflect both economic and non-economic motivations may cause utilities to go beyond mere compliance with existing environmental standards. Actions suppliers could take are:

1. Systematic analyses of the costs of meeting current environmental standards and regulations and future environmental standards and regulations which can reasonably be anticipated.

2. Reduction of the costs identified above through such means as process improvements, reduction of pollution, substitution of demand side management for electric energy, offsetting environmental impacts with additional activities, and selection of fuel, including solar and other renewable energy sources.

3. Sale of electricity from renewable resources to market segments willing to pay for improved environmental quality associated with renewables ("green pricing").

4. Market transformation activities to lead the industry in reducing adverse environmental effects of energy production.

5. Identification and analysis of technologies which have less adverse impacts on the environment than current practice.

6. Alliances with other organizations or programs for promoting environmental quality (e.g., the Environmental Protection Agency's Green Lights Program).

7. Corporate commitment to implement the strategic environmental plan.

These kinds of elements of an environmental strategic plan are consistent with IRP and with unregulated business planning in general. However, there is no guarantee that substantive voluntary actions will be taken.

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[9] Many industries incorporate environmental goals in their plans. See, for example, Sheryl Sturges and Jeffrey Hewitt, "Progress of a Policy Experiment: Climate Challenge Interim Report Card," *The Electricity Journal*, January/February 1995: 60-70; "The Challenge of Going Green," *Harvard Business Review*, July-August 1994: 37-50; Kurt Fischer and Johan Schot, eds., *Environmental Strategies for Industry*, Washington, D.C.: Island Press, 1993; Thomas Sullivan, ed., *The Greening of American Business, Rockville, Maryland*: Government Institutes, Inc. 1992; Paul Hawken, *The Ecology of Commerce*, New York: HarperCollins, 1993.

V. CONCLUSIONS

This report leads to many questions about the desirability and impact of restructuring the electric industry. There is not yet sufficient information for the Commission to make a decision about appropriate policy. This section establishes a framework for moving forward with the investigation of electric industry restructuring by proposing several principles for guiding future work and by identifying areas requiring additional information.

Principles

Having already spent several months gaining a better understanding of electric industry restructuring, it is now appropriate to distill broad principles to guide future steps.[10] The following principles are proposed.

- ☺ All groups (classes) of consumers should have an opportunity to benefit from restructuring of the electric industry, including near-term rate reductions.

- ☺ Consumers have varied preferences for electric energy services and the industry should respond to those preferences with an adequate menu of choices and unbundled services.

- ☺ A competitive marketplace tends to increase economic efficiency and reduce costs.

- ☺ Economic incentives for suppliers of electric energy services (including generation, transmission, and distribution) should reinforce economic efficiency.

- ☺ The market for electricity will be more efficient if: a) spot markets with publicly available prices exist; and b) investors in new power plants and other facilities can effectively manage the risks of those investments.

- ☺ Pricing of electric energy services should be sufficiently flexible to accommodate supply and demand changes in the marketplace.

- ☺ Environmental protection, achievement of energy efficiency through cost effective DSM, development of renewable resources, and retention of a long term resource planning perspective with public input are in the public interest; the responsibility

[10] Several organizations have developed principles regarding restructuring. See Edison Times, 1995 b and 1995c, Washington Utilities and Transportation Commission, 1995, Wisconsin Electric Company, 1995, and Northern States Power Company, 1994. The list of principles in the text above draws heavily from these sources.

for pursuing these goals should fall on all suppliers in the marketplace.

- ☺ The level of the reliability of the generation, transmission, and distribution systems should reflect consumer demand for reliability; however, a consumer's desire to save money should not result in diminished reliability (adverse externalities) for others who depend on the generation, transmission, or distribution system.

- ☺ The recovery of any stranded investment should be accomplished to balance the financial viability of utilities, investor expectations, and consumer benefits achieved through lower prices in the near term.

- ☺ Operational control of generation, transmission, and distribution should foster efficient use of resources and should not be used to restrict access to these resources.

- ☺ Efficient operation of generation, transmission, and distribution systems requires coordination among the parties controlling those resources.

- ☺ Industry and regulators should work toward reducing the costs of participating in wholesale and retail electricity markets (transaction costs).

- ☺ It is not necessary to plan all aspects of restructuring à priori because there exist mechanisms such as market prices and regulatory review for making mid-course corrections.

Obtaining Additional Information

The next phase of the Commission's investigation into restructuring will focus on obtaining more information about the options and their consequences as well as on obtaining opinions on the merits of the options. In particular, Staff will develop questions for interested parties to answer (in writing) to fill in the gaps in our knowledge. Then options can be evaluated using the criteria cited in Box A.

Areas requiring more information include:

- ♦ Estimates of stranded investment and of the potential aggregate savings for consumers if retail wheeling is introduced.

- ♦ How to solve the stranded investment problem fairly and efficiently.

- The degree to which all consumers will be able to benefit from restructuring.
- Assuming that the Commission allows retail wheeling, development of a process by which system operation is coordinated and system reliability is maintained.
- Creation of additional options other than the various forms of retail wheeling, traditional regulation, and performance based regulation discussed in this report.
- The conditions under which competition could fully or partially fail (e.g., concentrations of market power) and ways to mitigate or prevent those failures.
- Impacts of restructuring on low income consumers, the environment, energy efficiency, renewables, and long range planning.
- The design of incentives for better utility performance.
- How the law enables or restricts policies to improve the efficiency of the electric industry.
- The costs of restructuring, i.e. the transition costs (other than stranded investment) and transaction costs of a functioning restructured market.
- The risks associated with purchase and sale of electricity in a restructured market, the allocation of these risks, and risk management techniques which could be used.
- Identification of potential conflicts between state and federal jurisdiction over generation, transmission, and distribution, and development of processes for resolving those conflicts.

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